

Computers are machines. They have no inherent abilities and certainly are not able to make art. But if the computer is used by a person who knows how to make art and who is also able to use computers, then art might happen. Computers are tools. Tubes of oil paint and brushes are tools. Sticks of charcoal are tools. Art doesn't happen because of tools. It happens as a result of thought and passion emanating from people, and the expression of those ideas and feelings are made apparent by using tools. The tools don't make art, people make art using tools. Computer art doesn't exist. Art made by using computers does exist. These are obvious and simplistic statements but are also ideas that are often overlooked when trying to understand what it is that is happening with this idea of "computer art"

Computer art may be seen as an extension of video art. If it were not for the cathode ray tube, (CRT), much of what we know as computer art would not be visible. Most of the visual manifestations of computer-generated images, either still or moving, have their origins locked into video signals. Photography and other means of chemical replication are still dependent on CRT displayed images. Many of the people involved in the beginnings of video art, in the late sixties and early seventies, are using the computer as another tool for their art making. Often these people are not working exclusively with computers, at least not just digital computers. Often there is a mix of "analog" and digital within the frame. The term "analog" is used loosely to define signals that are not just on or off but are often somewhere between on and off. These signals or waveforms are usually named for their appearance when they are viewed on a CRT: triangle, sawtooth, ramp, and sinesoidal. Approaches to generating and controlling signals were originally defined during the development of audio synthesis machines. Many of those ideas have become standards for the control and generation of signals in video art and are now being adapted to computer control.

There is another simple way to realize computer signals as visual phenomena and that is through a translation to paper using what are commonly called "printers". These machines make marks when a small pin-like hammer hits an inked ribbon against a paper surface. Variations within this idea are: colored ribbons, shaped hammers ("=x+), no hammer but a small explosion set off by electricity that causes a dot of black or color, (cyan, magenta or yellow) to be deposited on paper, or a small electrical charge that burns a tiny portion of the paper's surface causing a black dot, and the use of machines called "plotters".

As I see it, a major problem with making art using computers is knowing how to use a computer. Ways of controlling computers are just now beginning to be developed for use by people who are not able to or interested in sitting in front of a keyboard and typing in commands that will cause the computer to do something. Most of the ways being developed to control computers use direct sensual activity, bypassing the need for translation into an intermediate symbolic language, english or a computer language of some sort. Light pens, drawing pads, knobs, switches, sound or voice control, and body movement are just some

of the ways being explored as serious control methods and perhaps, eventually, the only control methods needed to operate a computer.

I suppose if you really want to push the idea, there is no computer generated image. In addition to the way dots are made on paper (machines controlled by a computer) the CRT or TV screen is also only being controlled. People speak of resolution, 256 by 256 or 400 by 200 or maybe even 1024 by 1024. Those numbers represent the number of points or places on a TV screen that can be controlled by a computer. So, as an example, 400 by 200 means that 400 points or places from left to right and 200 points or places from top to bottom on the TV screen can be controlled by the computer. The way these points are controlled is by lighting them up. Most often about 16 shades of grey (from off to all the way on, like turning up a light dimmer) are controlled by the computer. This makes a black and white image. In color the image is generated by electrons bombarding areas on the screen that are combinations of red, green and blue. Each of these areas can have many combinations, and that is what causes the myriad of colors possible on the CRT. If you highly magnify a portion of your color TV screen it becomes apparent how these areas work. If the blue area is off and the other two are on you have yellow; if all three on it is white, all off is black and so on. A camera lens turned backwards or a loupe will magnify the screen enough to see the individual color areas. In order to have the computer make something happen on the tv screen a command must be given to the computer. The basis of controlling the CRT with a computer is to control each of the areas on the screen. In the language of computer programmers these areas are called picture elements or "pixels". If the resolution is 400 pixels across and 200 pixels down, that means that for every frame of recorded material (1/30th of a second) there are 80,000 pixels that could be used to define an image. Each pixel is controlled by a command from the computer. The simplest command could be to type one number that represents the location of one pixel on the screen and command it to be on or off. Or the commands could be controlled by a subroutine that allows a light pen to be used. Then all you do is touch the pen to the screen to have something happen. In any case, the complexity of consciously controlling each pixel of each frame is impossible (2,400,000 pixels a second), but if the computer is not given commands in some way nothing will happen.

Much of the expensive-to-own-and-to-operate part of computer graphics development often is caught up in the idea of trying to replicate nature as defined by the television industry: "In frame by frame animation can we store enough information to make the reflections on the Comet can follow in a way that emulates the lighting and other aspects of what we see on a television commercial?" and ultimately "can we also make a soap opera using characters that we have created which speak and move and seem like those that we see on television?" thus putting actors out of work, or perhaps freeing them to pursue something that might be more interesting. This area of "Computer Art" will become to television entertainment what robotics has become to the manufacture of automobiles, appliances, and of course, computers.

This all sounds very complicated and it is. There doesn't seem to be enough time to absorb the information necessary to operate and use the electronic tool to try to make art happen, when you discover that someone has made a "better" machine and yours is not only seen as obsolete but you haven't really started to explore its potential. Somewhere in this rather hectic, time compressed, world of fast change, most artists slow down and find a comfortable pace that allows thinking to become more important than keeping up with the latest tool development.

Individuals make visual art. Almost all of what we respect, save, and find worthy in visual art is attributable to an individual artist's thinking and often the same individual's production. Electronic visual art is not different. Very few people who make art have worked either with computers or with people who know about computers. Of course, access to computers capable of developing sophisticated graphics is limited because there are few of these machines, and they are expensive and complicated to operate. There is a growing interest in the use of personal computers as machines capable of visual art making and also in the development of low cost computers and software designed specifically to do the things necessary for making visual art possible. As sophisticated tools become less expensive, individual artists will be able to equip their studios and have their tools available when they want to make art. When that happens, the art will mature.